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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,680	05/03/2005	Dominique Placko	28944/40099	8651

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EXAMINER	
THORNEWELL, KIMBERLY A	

ART UNIT	PAPER NUMBER
2128	

DATE MAILED: 06/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/533,680	PLACKO ET AL.	
	Examiner	Art Unit	
	Kimberly Thornewell	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 May 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/29/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d).

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 7/29/2005 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

3. Figure 6 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claims 19-23 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to claims in the alternative only, and cannot depend from any other multiple dependent claim. See MPEP § 608.01(n). Accordingly, the claims have not been further treated on the merits.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.
7. Claims 18-23 are further rejected because line 4 of claim 18 reads "...of reflection and/or of transmission..." The use of alternative language renders the claim indefinite because the scope of the claim cannot be determined. Claims 19-23 are rejected because of their dependence on claim 18.
8. Claims 19-23 are further rejected because claims 19 and 20 are dependent on "claim 18, taken in combination with claim 6." The scope of these multiple dependent claims cannot be determined because one cannot tell how the

limitations of claim 18 and claim 6 are combined. Claims 21-23 are rejected because of their dependence on claim 19.

Claim Rejections - 35 USC § 101

9. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10. Claims 1-29 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Independent claim 1 is directed to a method of evaluating a physical quantity associated with an interaction between a wave and an obstacle in a region of three-dimensional space. However, after the claimed method is performed, a tangible result is not achieved. Rather, the method results in multiplying two matrices together in order to obtain a third matrix. No action is performed on the matrix once it is achieved. Furthermore, step b) of the method recites the limitation of forming a matrix system. Although claim 1 is intended to be a method claim, no steps are listed as to how the matrix system is formed. Rather, different portions of the matrix system, as would be described in a product claim.

Dependent claims 2-28 do not overcome the rejection because they merely further clarify how the third matrix is obtained, rather than obtain a tangible result from the method.

Independent claim 29 is directed to a computer program product that comprises instructions for carrying the same steps as those listed in claim 1.

Therefore, claim 29 also lacks a tangible result because no action is performed on the third matrix once it is obtained. Furthermore, even though claim 29 is directed to a computer program product comprising instructions for carrying the steps in the method of claim 1. However, similar to above, step b) does not describe how the matrix system is formed. Instead the claim states that the matrix is formed, comprising several elements. Similar to above, the claim is written as a product within a process claim.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 1-11, 15-18, 24 and 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Placko et al., "A Theoretical Study of Magnetic and Ultrasonic Sensors: Dependence of Magnetic Potential and Acoustic Pressure on the Sensor Geometry," published in Proceedings of SPIE Vol. 4335, July 2001.

As per claim 1, Placko teaches determining by meshing a plurality of surface samples (dSi), and allocating at least one source (Si) to each surface sample (page 53 section 2.1 lines 3-4).

Placko further teaches forming a matrix system comprising:

i. an invertible interaction matrix F(M) applied to a given region (M) of space (page 56 equation 9, F matrix) and comprising a number of columns corresponding to a total number of sources (page 53 section 2.2 lines 1-2);

ii. a first column matrix (page 56 equation 9, phi matrix), each coefficient of which is associated with a source (page 53 section 2.1 line 6);

iii. and a second column matrix, which is obtained by multiplication of the first column matrix by the interaction matrix (page 56 equation 9, theta matrix)

Placko further teaches assigning the chosen values of physical quantity (V(Pi)) to predetermined points (Pi), each associated with a surface sample (dSi), said chosen values (V(Pi) being placed in the second column matrix (page 53 section 2.1 lines 3-4), and multiplying the second column matrix by the inverse of the interaction matrix applied to the predetermined points (Pi) in order to estimate the coefficients of the first column matrix (vi) (page 56 equation 11).

Placko further teaches applying the interaction matrix to a given region (M) of three-dimensional space and multiplying the interaction matrix by the first column matrix comprising the coefficients estimated in step c) (page 56 equation 9).

Placko does not disclose expressly the surface samples representing the surface of an obstacle receiving a main wave and emitting a secondary wave, or

the allocated source emitting an elementary wave representing a contribution to the secondary wave. However, the reference does teach breaking the surface of a transducer into a plurality of surface samples, and using the matrix system as claimed to obtain the magnetic potential of the source and the flux emitted by the source. The magnetic field is analogous to the claimed main wave. The magnetic potential is analogous to the claimed secondary wave in that represented by the coefficients of the interaction matrix. The magnetic flux is analogous to the claimed elementary wave in that it is emitted from the source, and that the first column matrix characterizes the wave. It would have been obvious to one of ordinary skill in the art of evaluating interactions between a wave and an obstacle, at the time of the present invention, to use the teachings of the reference in order to evaluate a physical quantity associated with an interaction between a wave and an obstacle in a region of three-dimensional space. The motivation for doing so, as cited in the Placko reference, section 1, would have been to use the more basic Distributed Point Source Method, rather than the more complex finite element method, in order to evaluate the interactions.

As per claim 2, Placko discloses determining by meshing a plurality of surface samples of an active surface (page 54 second paragraph line 1) radiating the main wave (page 53 section 3.1 lines 1-2) and allocating a source emitting an elementary wave representing a contribution to the main wave to each sample of the active surface (page 54 second paragraph lines 1-2). Placko further

discloses applying steps b), c) and d) to the samples of active surface (page 56, equations 9, 10 and 11). Placko further discloses evaluating the quantity representing the interaction between the radiating element and the obstacle, by taking into account the contribution of the main wave emitted by the sources of the active surface and the contribution of the secondary wave emitted by the set of sources of the surface of the obstacles (taught as computing reluctance based on magnetic flux, potential and field values, page 56 paragraph 5, equation 13).

As per claim 3, Placko discloses each coefficient of the interaction matrix being representative of an interaction between a source and a given region of space, and the value of each coefficient being dependent on a distance between a source and the given region (taught as using C as the coordinate of the center for each source, page 55 equation 6).

As per claim 4, Placko discloses the interaction matrix comprising a number of rows corresponding to a total number of predetermined points (page 56 equation 11, 5 predetermined points, 5 rows in matrix).

As per claim 5, Placko discloses the physical quantity being a scalar quantity (page 56, equation 13), and a single source being allocated to each surface sample (page 53 section 2.1 lines 3-4).

As per claim 6, Placko discloses the interaction matrix comprising a row (page 56 equation 9).

As per claim 7, Placko discloses each predetermined point corresponding to a point of contact between the surface sample and a hemisphere whose surface

is equal to the surface of the surface sample, and whose center corresponds to a position of the source which is allocated to the surface sample (page 53 figure 1, section 2.1 lines 8-10).

As per claim 8, Placko does not disclose expressly the main wave being an electric wave, wherein the coefficients of the first column matrix are values of electric charge that are each associated with a source, and wherein the coefficients of the second column matrix are values of electric potential. However, on page 58, second paragraph, Placko discusses using electrical image methods using the DPSM model. In electrical image methods, it is obvious that the main wave would be an electrical wave emitted from a source (analogous to the magnetic wave emitted from a source on page 53 section 3.1 line 1), the values of the first column matrix would be values of electric charge (analogous to the magnetic flux, page 53 section 2.1 line 6), and the values of the second column matrix would be values of electric potential (analogous to the magnetic potential, page 53 section 2.1 lines 6-7).

As per claim 9, Placko discloses the main wave being a magnetic wave (page 53 section 3.1 line 1), the coefficients of the first column matrix being values of magnetic flux that are each associated with a source (page 53 section 2.1 line 6), and the coefficients of the second column matrix being values of electric potential (page 53 section 2.1 lines 6-7).

As per claim 10, Placko discloses the main wave being a sound wave (page 58 section 4.1 lines 1-2), the coefficients of the first column matrix being values

of speed of sound that are each associated with a source (page 59 last two lines), and the coefficients of the second column matrix being values of acoustic pressure (page 58 section 4.1 lines 3-4).

As per claim 11, Placko discloses the physical quantity to be evaluated being a vector quantity expressed by its three coordinates in three-dimensional space, and three sources being allocated to each surface sample (page 58 figure 9, section 4.1 second paragraph).

As per claim 15, Placko does not disclose expressly the main wave being an electric wave, wherein the coefficients of the first column matrix are values of electric charge that are each associated with a source, and wherein the coefficients of the second column matrix are values of electric potential. However, on page 58, second paragraph, Placko discusses using electrical image methods using the DPSM model. In electrical image methods, it is obvious that the main wave would be an electrical wave emitted from a source (analogous to the magnetic wave emitted from a source on page 53 section 3.1 line 1), the values of the first column matrix would be values of electric charge (analogous to the magnetic flux, page 53 section 2.1 line 6), and the values of the second column matrix would be values of electric potential (analogous to the magnetic potential, page 53 section 2.1 lines 6-7).

As per claim 16, Placko discloses the main wave being a magnetic wave (page 53 section 3.1 line 1), the coefficients of the first column matrix being values of magnetic flux that are each associated with a source (page 53 section

2.1 line 6), and the coefficients of the second column matrix being values of electric potential (page 53 section 2.1 lines 6-7).

As per claim 17, Placko discloses the main wave being a sound wave (page 58 section 4.1 lines 1-2), the coefficients of the first column matrix being values of speed of sound that are each associated with a source (page 59 last two lines), and the coefficients of the second column matrix being values of acoustic pressure (page 58 section 4.1 lines 3-4).

As per claim 18, Placko does not disclose expressly the contribution of the secondary wave being dependent on a predetermined coefficient of reflection or transmission of the main wave by each surface sample of the obstacle. However, it is well known in the art of wave propagation that when a wave meets a planar object the wave is reflected. Therefore since the obstacle is receiving the main wave and emitting the secondary wave in response, the coefficient of reflection would have to be taken into consideration in order to estimate the contribution of the secondary wave.

As per claim 24, Placko discloses the main wave being a sound wave and the coefficients of the interaction matrix being dependent on an angle of incidence of an elementary wave emitted from a source in the region (page 60 section 4.2 paragraph 5 lines 1-5).

As per claim 26, Placko discloses the main wave being a sound wave and a total number of surface samples being chosen substantially as a function of

wavelength of the sound wave so as to satisfy the Rayleigh criterion (page 59 second paragraph, equation 15).

As per claim 27, Placko discloses the plurality of values of the physical quantity obtained for a plurality of regions in space being compared so as to select a candidate region for the placement of a radiating element intended to interact with the obstacle (page 60 paragraph 3 lines 2-5).

As per claim 28, Placko discloses the radiating element being a sensor, for nondestructive testing (figure 5, page 56 section 3.4 line 2).

As per claim 29, Placko teaches a computer program product comprising instructions for implementing a method of evaluating a physical quantity associated with an interaction between a wave and an obstacle, comprising the step of determining by meshing a plurality of surface samples (dSi), and allocating at least one source (Si) to each surface sample (page 53 section 2.1 lines 3-4).

Placko further teaches forming a matrix system comprising:

iv. an invertible interaction matrix F(M) applied to a given region (M) of space (page 56 equation 9, F matrix) and comprising a number of columns corresponding to a total number of sources (page 53 section 2.2 lines 1-2);

v. a first column matrix (page 56 equation 9, phi matrix), each coefficient of which is associated with a source (page 53 section 2.1 line 6);

vi. and a second column matrix, which is obtained by multiplication of the first column matrix by the interaction matrix (page 56 equation 9, theta matrix)

Placko further teaches assigning the chosen values of physical quantity (V(Pi)) to predetermined points (Pi), each associated with a surface sample (dSi), said chosen values (V(Pi) being placed in the second column matrix (page 53 section 2.1 lines 3-4), and multiplying the second column matrix by the inverse of the interaction matrix applied to the predetermined points (Pi) in order to estimate the coefficients of the first column matrix (vi) (page 56 equation 11).

Placko further teaches applying the interaction matrix to a given region (M) of three-dimensional space and multiplying the interaction matrix by the first column matrix comprising the coefficients estimated in step c) (page 56 equation 9).

Placko does not disclose expressly the surface samples representing the surface of an obstacle receiving a main wave and emitting a secondary wave, or the allocated source emitting an elementary wave representing a contribution to the secondary wave. However, the reference does teach breaking the surface of a transducer into a plurality of surface samples, and using the matrix system as claimed to obtain the magnetic potential of the source and the flux emitted by the source. The magnetic field is analogous to the claimed main wave. The magnetic potential is analogous to the claimed secondary wave in that represented by the coefficients of the interaction matrix. The magnetic flux is analogous to the claimed elementary wave in that it is emitted from the source,

and that the first column matrix characterizes the wave. It would have been obvious to one of ordinary skill in the art of evaluating interactions between a wave and an obstacle, at the time of the present invention, to use the teachings of the reference in order to evaluate a physical quantity associated with an interaction between a wave and an obstacle in a region of three-dimensional space. The motivation for doing so, as cited in the Placko reference, section 1, would have been to use the more basic Distributed Point Source Method, rather than the more complex finite element method, in order to evaluate the interactions.

Allowable Subject Matter

13. Claims 12-14 and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

14. The following is an examiner's statement of reasons for allowance:

As per claim 12, while Placko teaches the interaction matrix being applied to a region of space, the reference does not teach the matrix comprising a row for each space coordinate.

As per claim 13, while Placko teaches the sources allocated to each surface sample being substantially in one and the same plane (figures 11a and 11b), the reference does not teach each predetermined point associated with a surface sample corresponding to a point of contact between the sample and a

hemisphere hwose surface is equal to the surface of the sample, and whose center corresponds to the position of a barycenter of the three sources.

Claim 14 is deemed allowable as it depends from allowable claim 13.

As per claim 25, Placko teaches the value of each surface sample being determined as a product of a first vector normal to the surface sample and directed towards the apex of the hemisphere and a second vector drawn between a source associated with the hemisphere and the given region. However, Placko does not teach distinguishing between the case where the scalar product is less than a predetermined threshold and the contribution of the source is not taken into account; and the case where the scalar product is greater than a predetermined threshold and the contribution of the source is actually taken into account.

15. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(a) "An Original Approach to Eddy Current Problems Through a Complex Electrical Image Concept," by Dufour and Placko, published in IEEE

Transactions on Magnetics, March 1996, discloses a method for analysis of interactions of electromagnetic waves between an emitting object and an obstacle.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly Thornewell whose telephone number is (571)272-6543. The examiner can normally be reached on 8am-4:30pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571)272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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